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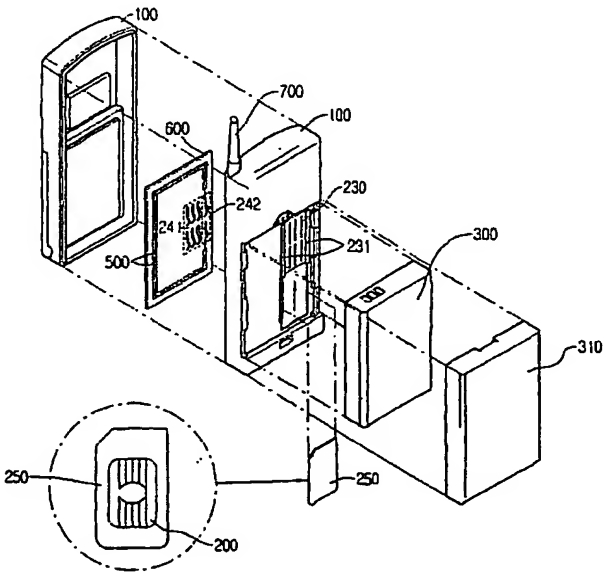
(54) Title: PORTABLE TELEPHONE HAVING SMARTCARD WHICH NON-CONTACT INTERFACE IS TRANSFERRED INTO BREAK CONTACT POINT



(57) Abstract: Disclosed herein is a portable telephone equipped with a smart card. The telephone has a portable telephone body (100), a battery (300), a Printed Circuit Board (PCB) (600) and an external antenna (700). The telephone further includes a smart card socket (230) formed in a back of the portable telephone body (100), socket contacts (240) formed on the PCB (600), a smart card chip (200) attached to the smart card for processing data and performing input and output functions, chip contacts (254) formed on an outer surface of the chip and combined with the socket contacts (240), and an internal antenna (500) formed near the PCB (600) and connected to two of the socket and chip contacts.

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PORTABLE TELEPHONE HAVING SMARTCARD WHICH NON-CONTACT INTERFACE IS TRANSFERRED INTO BREAK CONTACT POINT

Technical Field

The present invention relates to a structure, in which a socket, which is the smart card connector of a portable telephone, is additionally provided with a contact to which an internal antenna for wirelessly exchanging data with an Electronic Fund Transfer terminal-Point Of Sale (EFT-POS) terminal is connected, and a plug-in type detachable smart card, the internal antenna and the portable telephone are interconnected to one another through socket contacts.

In particular, the present invention relates to a portable telephone combined with a smart card, in which a socket, which is capable of being combined with a plug-in type smart card considerably smaller than a conventional smart card having a size equal to that of an existing credit card, is formed in the back of a portable telephone to allow the break contacts of a smart card to be used as a contact for being connected to an internal antenna, a second contact is additionally formed on the connector of the socket to be connected to the break contact of the smart card, both ends of the internal antenna situated at a certain position of a portable telephone are connected to one side of the second contact, and break contacts C4 and C5 of a plug-in type detachable smart card are connectable to the other side of the second contact. Accordingly, the portable telephone, the smart card and the internal antenna can be connected to one another without adding an additional socket or device and, at the same time, the portable telephone combined with the smart card can be used in both wire and wireless environments using a single smart card chip integrally connected to the internal antenna of the portable telephone.

Background Art

A smart card denotes a device that is fabricated by attaching a semiconductor chip including a memory and a Central Processing Unit (CPU) on the upper-left portion of a card to have the same size as a general credit card. It is also called an Integrated Circuit (IC) card, a CPU card, or a chip card.

A chip for smart cards generally includes a microprocessor functioning the same as a CPU, a Read Only Memory (ROM) in which a card management system and an encryption algorithm are stored, an Erasable and Programmable ROM (EPROM) or Electrically Erasable and Programmable ROM (EEPROM) for storing user data, and an encryption processor for ensuring safety.

The chip has a thickness of 0.3 mm and a size of 25 mm^2, so it occupies a considerably small space in comparison with a magnetic strip of a conventional magnetic card. However, the chip has an information storage capacity at least 1,000 times greater than the magnetic card, and an excellent stability in information recording and storage.

Accordingly, electronic money, credit cards, debit cards and telephone cards, which are all magnetic cards, are being replaced by smart cards.

Additionally, the smart cards are used as payment and authentication cards for a variety of electronic commerce such as B2B, B2C and B2G that are implemented on the Internet as information and communications technology is developed and electronic commerce is increased, authentication and international roaming cards required to universally utilize mobile communication systems in the world, medical welfare cards that allow users to utilize medical welfare benefits and prevent doctors or pharmacists from charging excessive medical fees, and public telephone cards that enable Web surfing. The use of the smart cards is extended to every industrial field. This means that smart cards function as links between computers and human beings in the communication technology age.

Additionally, in Code Divisional Multiple Access (CDMA) systems and third generation mobile communication systems, there have been many attempts at

combining smart cards popularized as described above with mobile communication terminals, that is, mobile phones, which are closely connected with our daily lives and have become necessities. That is, recently, mobile phones, or communication media, are combined with electronic money.

In order to integrally deal with a variety of electronic commerce, it is indispensably required that storage media are made to have a large capacity and related devices for utilizing the storage media, that is, mobile phones, are miniaturized and made to have a high level of function.

In such a situation, a primary concern is how a mobile phone is miniaturized and a variety of functions are integrated together and used conveniently and freely.

This is, the above-described concern is directly connected with a problem that the function of a Subscriber Identity Module (SIM) card defined by a West European communication organization ETSI is extended to be used in CDMA systems and third generation mobile communication systems and, simultaneously, a problem of wire interface, which is a problem of a mobile communication card, must be overcome.

In the meantime, smart cards are classified into contact type cards and non-contact type cards according to data input/output fashions. The contact type cards allow information to be read therefrom and written thereon while the cards are inserted into card reader/writers and their contacts are brought into contact with each other. On the other hand, the non-contact type cards can exchange data with card reader/writers through wireless communication with the card reader/writers using current induced to coils contained in the cards when cards enter a certain range around card reader/writers.

The non-contact type cards are gradually used more and more because of their convenience of use in spite of a variety of technical problems. The technology of non-contact type smart cards is relatively actively developed.

The present invention is focused on the non-contact type cards. An

internal antenna that can receive data in a non-contact mode is attached to a mobile phone, and a smart card can be operated and data exchanges can be exchanged using break contacts of a smart card combined with a mobile phone.

Currently known methods of combining mobile phones with smart cards (IC cards) are the following two.

One method is a basic method, which is concerned with an electronic smart card such as a traffic card that is usable in a wireless environment. As shown in Figs. 1 and 2, an internal antenna 50 and a chip 20 are inserted into a thin film 21 to form a thin film body, and a thin film smart card is inserted into a certain portion of a portable telephone 10 or a smart card chip 20 and the internal antenna 50 are directly inserted into a flap 22, thereby eliminating inconvenience that the smart card is separately carried by a user.

However, the above method is disadvantageous in that it is contrary to a trend toward miniaturization because the entire structure of an existing portable telephone not only is changed to provide a space for receiving the smart card, but also the thickness of the portable telephone is increased by a thickness "t" of the smart card (see Fig. 1). Additionally, the above method is disadvantageous in that the smart card is unfit for an information terminal used to carry out a variety of electronic commerce while accessing the Internet because the portable telephone and the smart card are mechanically coupled with each other but electrically disconnected from each other to disable the sharing and exchanging of information (see Figs. 1 and 2).

In the other method, as shown in Fig. 3, a socket is formed in the back of a portable telephone at a certain position to be engaged with a plug-in type SIM card 25 that is smaller than a conventional smart card having a size equal to that of a credit card, and the SIM card 25 is brought into contact with the contacts 24 of the socket 23.

In accordance with the above methods, the smart card 25 can be mounted on and dismounted from the portable telephone 10 in a relatively simple way and

exchange information with the portable telephone 10 while the portable telephone 10 and the smart card chip 20 are electrically connected to each other without considerably increasing the size. Accordingly, the above method is advantageous in that the smart card can be utilized as an information terminal for on-line electronic commerce while accessing the Internet.

When it is necessary to use the smart card 25 connected to a wireless terminal used in a wireless environment such as EFT-POS terminal, it is almost impossible to do so because the smart card 25 cannot wirelessly communicate with the terminal. In order to allow the smart card 25 to be used in the wireless environment, an additional electronic money smart card should be provided. Alternatively, the smart card 25 is mechanically combined with the portable telephone 10 in the method shown in Figs. 1 and 2, and should be electrically connected to an on-line smart card 25 such as a conventional credit card using an additional socket.

That is, in accordance with the conventional technology, a single smart card cannot be utilized as an information terminal that is capable of being used in both wire and wireless environments.

Disclosure of the Invention

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to solve the problem of interface to a wire application system that a SIM card has, in such a way that an interface of smart card contacts are modified and a portable telephone, a smart card internal antenna and a smart card are integrated into a single portable telephone of the present invention.

In more detail, the present invention has the object, in which the internal antenna is formed near the Printed Circuit Board (PCB) (or a portion of a battery or casing) to which the card socket for reading the smart card is attached,

physically and electrically connected to the second contact for being additionally connected to the break contacts of the smart card and connected to a semiconductor element (CPU) contained in the smart card, such that the smart card chip, the internal antenna and the portable telephone are electrically connected to one another to form a communication circuit, thereby electrically connecting the smart card and the portable telephone to each other without increasing the volume of the portable telephone and providing a new socket, and carrying out a variety of services including the use of affiliated shops, the use of traffic facilities such as buses and subway trains and electronic commerce services related to the smart card via mobile communication by a single SIM card.

Brief Description of the Drawings

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is an exploded perspective view of a conventional portable telephone combined with a film type smart card;

Fig. 2 is a perspective view of a conventional portable telephone with a smart card attached to the flap of a portable telephone;

Fig. 3 is an exploded perspective view of a conventional portable telephone combined with a conventional six contact SIM card;

Fig. 4 is an exploded perspective view of a portable telephone in accordance with the present invention;

Fig. 5 is a view showing the connecting contacts of a chip and a PCB in accordance with the present invention;

Fig. 6 is a block diagram showing an electrical construction of the present invention;

Fig. 7 is a view showing the specifications of the contacts of the chip

defined by International Standards Organization (ISO); and

Fig. 8 is a view in which an internal antenna and contacts are printed on the PCB.

*****Description of reference characters of principal parts of the drawings*****

100 portable telephone body	200 smart card chip
230 socket	231 slider
240 socket contacts	242 socket second contact
241 socket first contact	254 chip contact
250 smart card	251 chip first contact
252 chip second contact	253 CPU
300 battery	310 battery cover
600 PCB	700 external antenna
800 portable telephone	810 control unit
820 input/output unit	830 internal antenna
840 voice signal processing unit	841 speaker
842 microphone	850 manipulation unit
860 image signal processing unit	861 display unit
870 memory	880 power
881 switch	900 smart card
910 CPU	920 memory
921 ROM	922 EPROM (EEPROM)
930 encryption processor	

Best Mode for Carrying Out the Invention

In order to achieve the above object, a construction of the present invention is described with reference to Fig. 4 as follows.

A portable telephone of the present invention is characterized by a portable telephone body 100 for enabling communication and manipulation of an

Integrated Circuit (IC) card, a battery 300 combined with a back surface of the portable telephone body 100 for supplying power to the portable telephone body 100, a PCB 600 contained in the portable telephone body 100 and comprised of electric elements for performing communication and information processing, and an external antenna 700 for inputting signals to and outputting signals from the portable telephone body 100, a smart card socket 230 formed in a back of the portable telephone body 100 to correspond to a position of chip contacts, a first socket contact 241 for electrically connecting the smart card and the portable telephone and exchanging information via the Internet, a second socket contact 242 for electrically connecting the smart card and the portable telephone and wirelessly exchanging information with a terminal through the internal antenna, a smart card chip 200 attached to the smart card for processing data and performing input and output functions, a first chip contact 251 for electrically connecting the smart card and the portable telephone and exchanging information via the Internet, a second chip contact 252 for electrically connecting the smart card and the portable telephone and wirelessly exchanging information with the terminal through the internal antenna, and an internal antenna 500 formed near the PCB 600 or a certain structure and connected to the socket and chip contacts.

The construction and operation of the present invention are described with reference to Figs. 4 to 8.

The exterior structure of the present invention is described first.

A socket 230 is formed on the rear surface of a mobile phone 100 at an appropriate position of a portion where the mobile phone 100 is combined with a battery 300. This appropriate position is described as, for example, a right upper end portion of the battery 300 that is only a position selected depending on the structure of a general mobile phone. The position is not fixed. Accordingly, the appropriate position can be changed according to the structure of the mobile phone 100 and the circuit of the PCB 600.

Conventional sockets 230 include sockets having six or eight connector

silts or a single silt into which all contact silts are integrated. Any of the sockets is adapted to allow only six contacts except for two break slits to be used for connection.

That is, the two contacts C4 and C5 are break contacts because they are not provided with functions. The contacts C4 and C5 are not electrically connectable contacts, or not used though they are connectable contacts.

These two contacts C4 and C5 are break contacts that are provided with functions of internal antenna contacts 242 and 252 in the present invention. These contacts are connection contacts that make the use of smart cards possible in wire or wireless environment.

When the SIM card 250 is put on the socket 230 and pushed upward (in the direction of the arrow of Fig. 4) along slide guides 231, the SIM card 250 is combined with the socket 230.

The combination manner of the SIM card 250 and the structure of the socket 230 are the same as the conventional manner and structure shown in Fig. 3, except that the number of contacts is increased from six to eight.

Thereafter, a battery 300 is placed on the SIM card 250 and a battery cover 310 is put around the battery 300, so the mounting of the smart card is completed.

Hereinafter, the electrical connection of the portable telephone is described with reference to a block diagram of Fig. 6.

Services related to electronic commerce are carried out by a control unit 810 of a portable telephone 800 through first contacts 241 and 251. Since such a process is carried out in the same way as a conventional signal processing manner shown in Fig. 3, a detailed description thereof is omitted.

Meanwhile, if information wirelessly received from a terminal of an EEP-POS system such as a traffic-related system is inputted to a CPU 910 contained in the chip 200 of the smart card 250 through an internal antenna 500 and second contacts 242 and 252, the inputted information along with data related to a

corresponding service and stored in a memory is transmitted to the control unit 810 of the portable telephone 800 through the first contacts 241 and 251. If a signal is inputted from a card unit 900, the control unit 810 calls a central server (not shown), which provides a corresponding service, through an input/output unit 820 and an external antenna 830, provides the service in accordance with the conventional signal processing manner after carrying out a verification process such as a subscriber authentication process, and provides its result to a user through an image signal processing unit 861 and a voice signal processing unit 840.

The subscriber authentication process can be carried out through a keyboard of a manipulation unit 850 or a microphone 842 as occasion demands. In some cases, the authentication process can be omitted according to a subscriber's intent.

Although the first contacts 241 and 251 and the second contacts 242 and 252 are separated from each other to facilitate the explanation of a signal flow, they are integrally formed on a single socket 230 or chip as shown in Fig. 4 or 5.

Additionally, as described above, the internal antenna 500 can be contained in a convenient portion of the PCB 600, the battery 300, the casing 100 and 310 or any portion of the portable telephone.

After a corresponding server bi-directionally exchanges data with a user, the user confirms the service and is notified of a service result. Thereafter, the service result is stored in a memory of a card and the process is terminated.

Since a signal processing process of indicating the service result to the outside through a voice signal processing unit or display is well known in the field of the art, a detailed description of the process is omitted.

Smart cards, which are used here, include an ID-1 type and a Plug-I type called SIM cards, which refer to those defined in standards of ETSI GSM 11.11. This is adopted only for ease of explanation. Hence, they are not limited to those defined by the standards. All smart cards that can be used in wire and wireless

environments through their break contacts fall under the scope of the application of the present technology.

In addition, the conventional SIM card and the smart card of the present invention is the same in that they are based on the electrical and logical standards of ISO 7816 and ETSI GSM 11.11 ad 11.14. The smart card of the present invention is characterized in that two unused break contacts of the eight contacts of the conventional smart card are combined with the connection portions of the non-contact mode of the semiconductor element used in the smart card to allow the break contacts to be utilized, thereby allowing a single card to be used in both wire and wireless environments.

The reason why the break contacts are utilized in the present invention is that the smart card and the portable telephone are integrated into a single body so that functions such as electronic money loading, credit, debit trade information exchange, royalty point provision, authentication using a secret key and electronic signing are used in interface terminals such as EFT-POS terminals and portable telephones, and basic functions such as subscriber authentication, international roaming and value-added services are also carried out, thereby providing convenience to subscribers.

The SIM card socket, which is the smart card connector and is positioned on the back surface of the portable telephone, has a total of eight jigs (contacts), and allows the smart card to be removed therefrom.

When the smart card is mounted on the portable telephone, two of the jigs always press on break contacts. If the portable telephone is positioned within the coupling distance of the interface terminal, a signal is inputted through the contacts and the portable telephone comes under the control of the CPU of the smart card.

As described above, the internal antenna is not necessarily mounted on the PCB, but may be mounted on any portion of the casing of the telephone or a battery as long as the portion can be easily brought into contact with the break contacts of the chip. A handset should function as the internal antenna within a

induction distance of electromagnetic waves received from the terminal, and the size (the length and the number of wounds) of the internal antenna should be designed, printed and attached to electrically and electronically react sufficiently to such an induced voltage. Additionally, of course, the internal antenna should be physically and electrically connected to two jigs (break contacts) of the SIM card socket.

Fig. 8 is a detailed view in which the internal antenna 500 and the contacts 241 and 242 are copperplate-printed on the PCB 600. The socket 230 of the portable telephone is combined with the PCB 60 at the position of the contacts 241 and 242, and the SIM card is combined with the PCB 60 through the chip contacts 251 ad 252.

The IC card chip is a 32-bit MCU Embedded IC card interface chip with consideration taken of compatibility, which allows the interface chip to be used in conjunction with an open type electronic money terminal that is currently being developed in Korea. However, the chip is not limited to such a kind of specification, but may be any of 8-bit, 16-bit and MCU chips used in non-contact type cards and combination cards that satisfies international standards ISO 7816 and 14443.

Additionally, the physical specifications of the cards are an ISO size of 85 × 54 mm and a SIM plug-in size of 15 × 20.8 mm. The SIM plug-in size is selected to be preferable to the ISO size that has the excessive physical size.

In particular, with regard to the chip used in the present invention, there is a primary concern about whether to satisfy ISO/IEC 781 and 14443, which define the physical characteristics of non-contact cards.

For reference, the physical construction and arrangement specification of the IC card chip defined by ISO are described in Fig. 7.

The chip has a total of eight contacts, and the contacts are named C1 to C8.

The functions of the contacts are described as follows. The contact C1 is

a contact Vcc that applies a power voltage. The contact C2 is a contact that is used by a reset signal supplied from the terminal or in conjunction with an additional internal reset control circuit. The contact C3 is a contact that provides a clock or timing signal. The contact C5 is a ground contact having a reference voltage. The contact C6 is a Vpp contact that inputs a programming voltage. The contact C7 is an input/output contact that receives data from and transmits data to the terminal.

In such a case, the contacts C4 and C8 are reserved contacts and in a break state. The present invention intends these break contacts to be used as contacts for the internal antenna.

Industrial Applicability

As described above, the present invention provides a portable telephone and smart card combination, in which a portable telephone is combined with a smart card, into which electronic money cards such as credit and traffic cards are integrated, using break contacts of a smart card chip without an increase in the size of the portable telephone.

That is, with the development of information technology, a variety of cards such as authentication, electronic money, credit and payment cards are integrated into a single card, and the single card is used while being combined with a portable telephone.

Functions of Universal Identity Module (UIM), Universal Subscriber Identity Module (USIM) and SIM cards being mentioned as mobile communication cards are basically implemented in a plug-in type smart card according to international standards, and data exchange is wirelessly performed through the portable telephone to provide a medium that can be used in both wire and wireless environments, so that an electronic money infrastructure having a plurality of non-contact type master cards and traffic card readers are utilized,

debit, credit, Internet and remote financial functions and communication functions including authentication, roaming, additional communication and royalty functions requested by communication companies are integrated in a single card, and the card can be utilized through the portable telephone.

Claims

1. A portable telephone equipped with a smart card, the portable telephone having a portable telephone body 100 for enabling communication and manipulation of an Integrated Circuit (IC) card, a battery 300 combined with a back surface of the portable telephone body 100 for supplying power to the portable telephone body 100, a Printed Circuit Board (PCB) 600 contained in the portable telephone body 100 and comprised of electric elements for performing communication and information processing, and an external antenna 700 for inputting signals to and outputting signals from the portable telephone body 100, further comprising,

a smart card socket 230 formed in a back of the portable telephone body 100 to correspond to a position of chip contacts, socket contacts 240 formed on the PCB 600 to correspond to a position of the smart card socket 230 for electrically connecting the smart card and the portable telephone, exchanging information via the Internet and wirelessly exchanging information with a terminal through an internal antenna, a smart card chip 200 attached to the smart card for processing data and performing input and output functions, chip contacts 254 formed on an outer surface of the chip and combined with the socket contacts 240, and an internal antenna 500 formed near the PCB 600 and connected to two of the socket and chip contacts.

2. The portable telephone according to claim 1, wherein the socket contacts 240 comprises a first socket contact 241 for electrically connecting the smart card and the portable telephone and exchanging information via the Internet, and a second socket contact 242 for electrically connecting the smart card and the portable telephone and wirelessly exchanging information with a terminal through the internal antenna; and the chip contacts 254 comprises a first chip contact 251 for electrically connecting the smart card and the portable telephone and

exchanging information via the Internet, and a second chip contact 252 for electrically connecting the smart card and the portable telephone and wirelessly exchanging information with the terminal through the internal antenna.

3. The portable telephone according to claim 1, wherein the internal antenna 500 is inserted into a casing or battery of the portable telephone.

Fig. 1

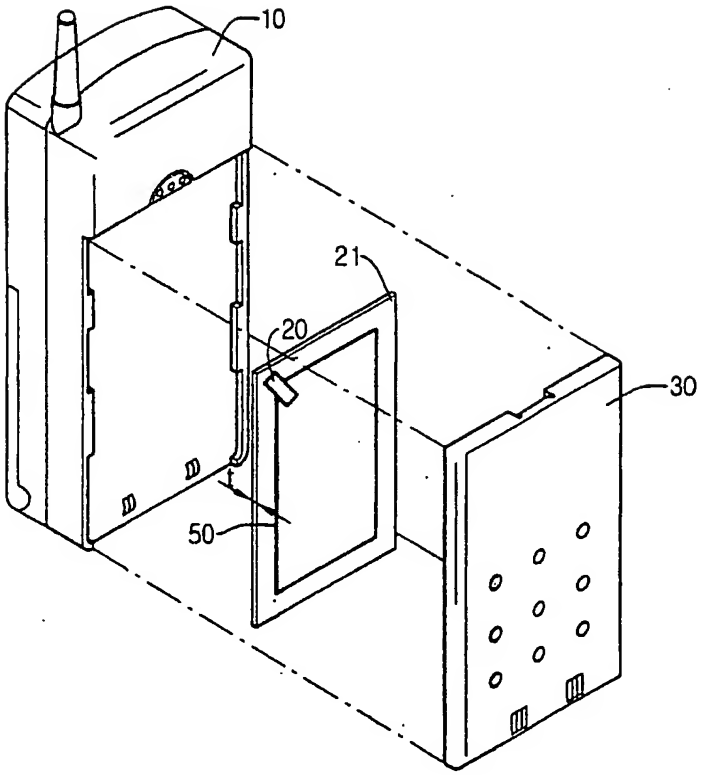


Fig. 2

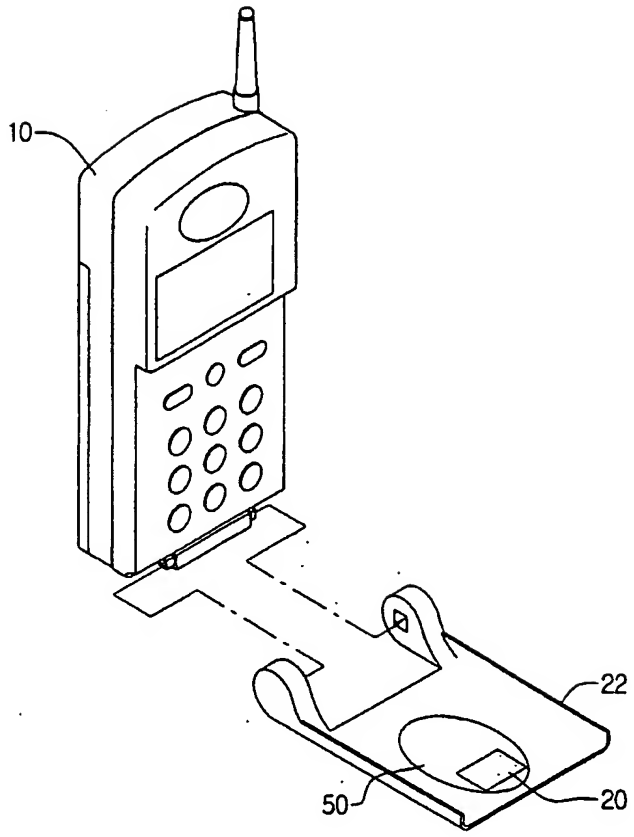


Fig. 3

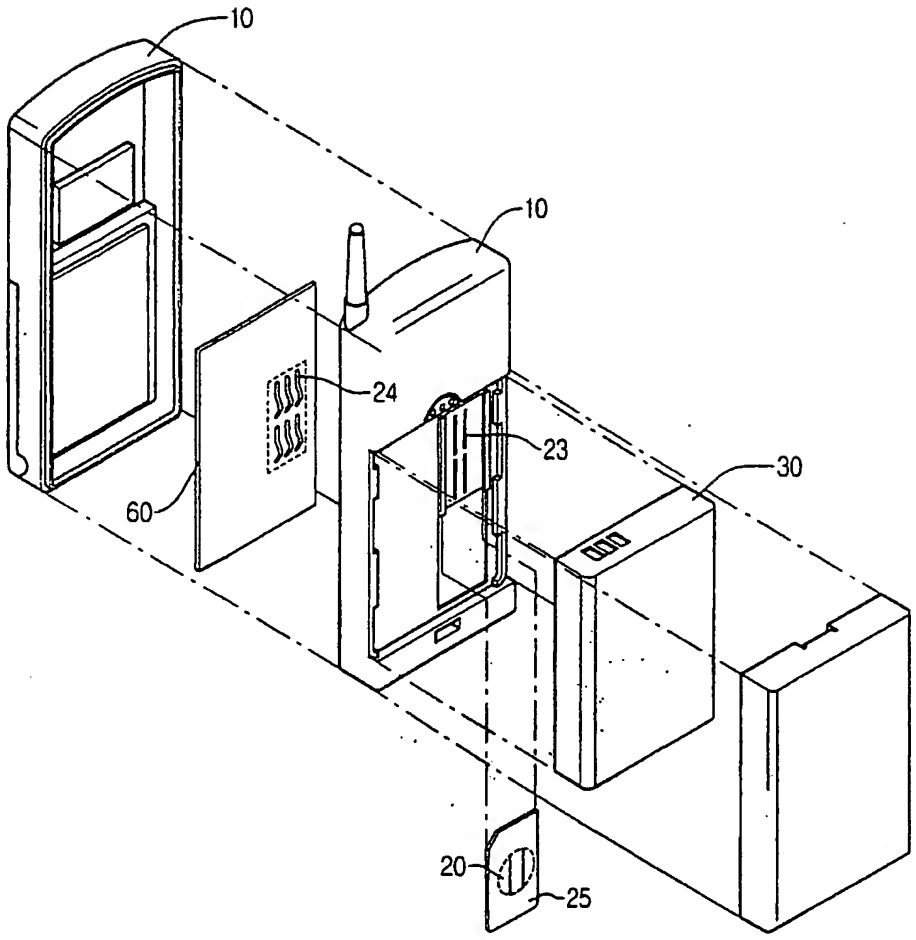


Fig. 4

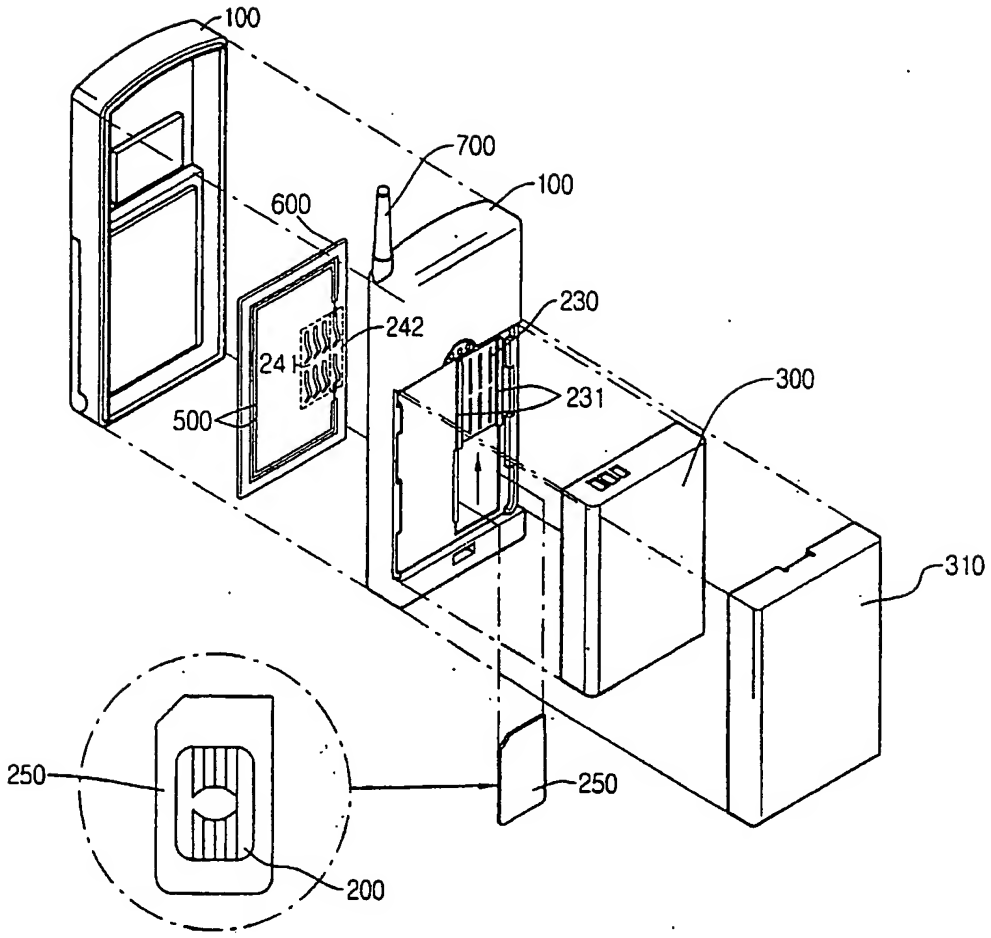


Fig. 5

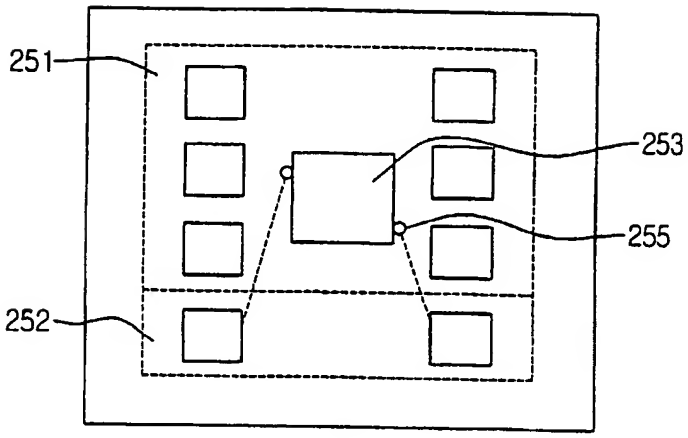


Fig. 6

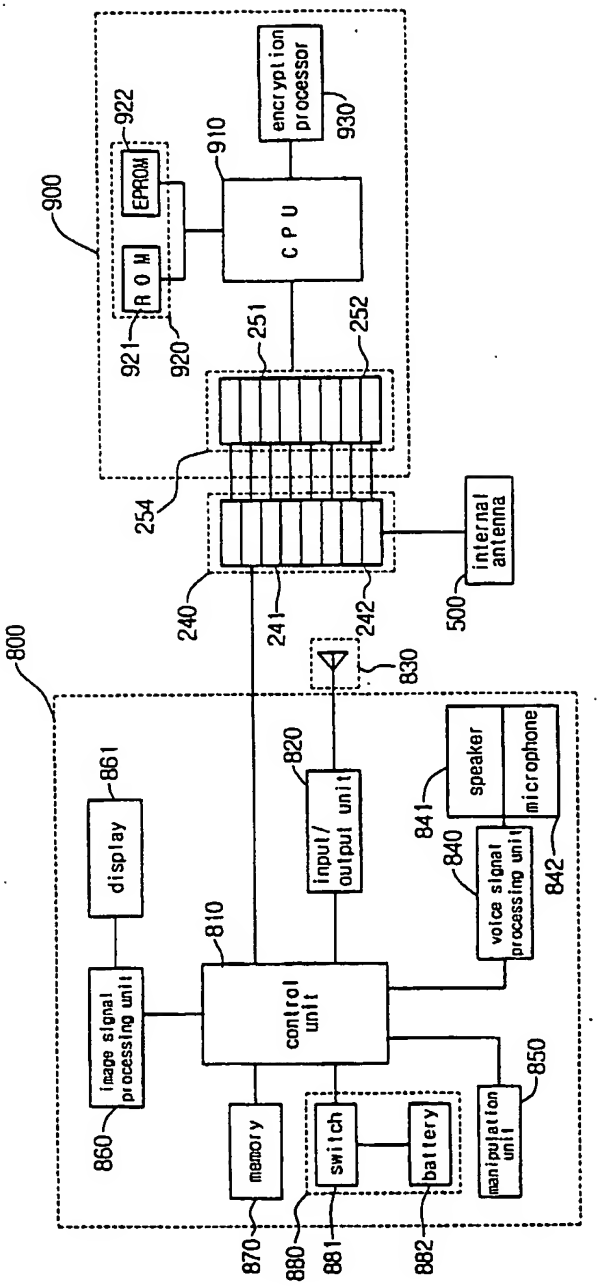


Fig. 7

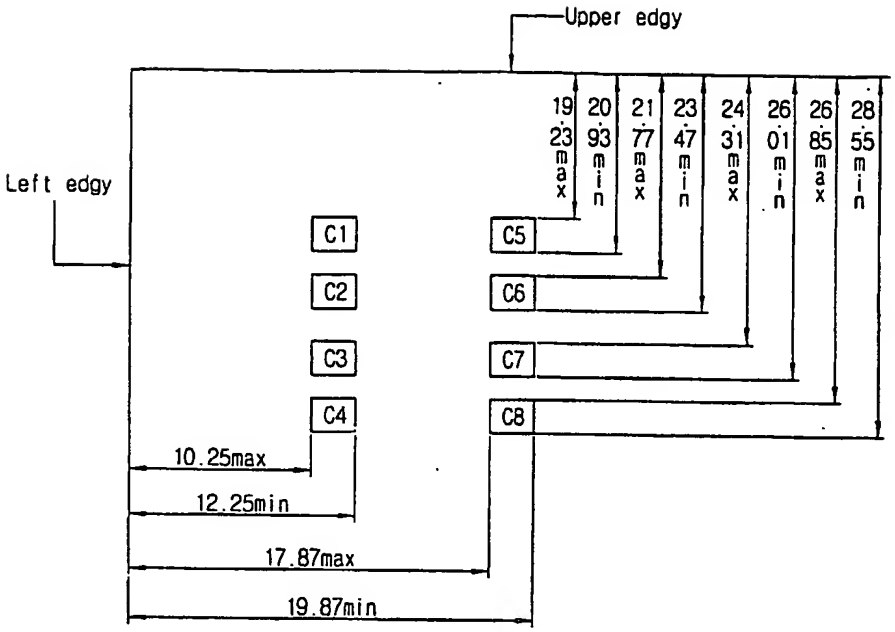
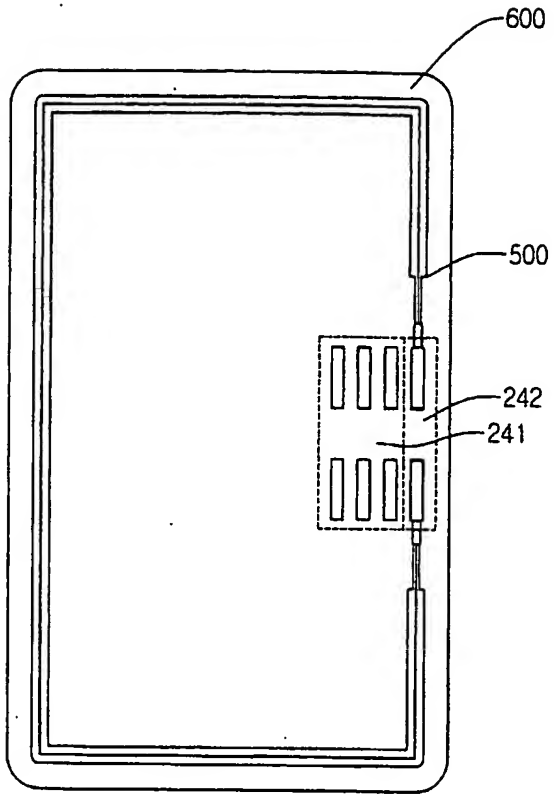


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR02/00036

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H04B 1/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04B 1/40, G06K 19/07

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975, Korean Utility models and applications for Utility models since 1975
Japanese Patents and applications for inventions since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2000-13139 A (C MEDIA:KK , ITOCHU CORP) 9 MAR 2000, see whole document	1
A	KR 98-65233 A (KI DU-SUK) 25 NOV 1998, see abstract	1
A,P	KR 2001-82991 A (KIM MYOUNG-SUN) 31 AUG 2001, page 3 lines 20 - lines 31, figure 2	1
A	KR 98-42963 A (JUNG MYOUNG-DUK) 17 AUG 1998, page 2 lines 21 - page 3 lines 3, figure 1,2	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
25 FEBRUARY 2002 (25.02.2002)	25 FEBRUARY 2002 (25.02.2002)

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 920 Dunsan-dong, Seo-gu, Daejeon Metropolitan City 302-701, Republic of Korea Facsimile No. 82-42-472-7140	KIM, Choon Seok Telephone No. 82-42-481-5947

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Information on patent family members

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